

Introduction

Definition

Simplistically, watershed based pollutant trading is allowing one entity to remove or prevent additional pollutant discharges while allowing another to discharge more, under the control of an agreement between the two parties involved in the trade. From the economic side, watershed based trading is a tool to be used in watershed management whereby all sources contribute to reducing pollution without any one entity bearing an excessive financial burden. This shift in responsibility may result in a more equitable, efficient, cost-effective means to address water quality problems in a watershed.

History

The national effort to allow for watershed based pollutant trading or effluent trading began as a result of President Clinton's "Reinventing Environmental Regulation" program released March 16, 1995. EPA provided guidance to the states in June 1996 to assist in evaluating and designing trading programs. At the state level efforts to encourage trading in Wisconsin began with Act 27 of the Laws of 1997 passed October 14, 1997. S. 283.84 Wis. Stats. authorized the Department of Natural Resources to administer at least one pilot project to evaluate the trading of water pollution credits. Under this law, a pilot project may allow a permittee to discharge pollutants at levels above what they otherwise would be authorized in their permit if they reach an agreement with one of the following:

- a) another permittee willing to reduce their pollutant load to levels below their permit (Point to Point trading)
- b) another person, not required to obtain a permit, but willing to reduce their pollutant load. (Point to Nonpoint trading)
- c) the department or a unit of government willing to accept payment that in turn is used to reduce pollutants. (Brokering)

The pilots were to be selected using the following criteria:

- 1)The area is the watershed or a portion of the watershed of an impaired water body.
- 2)The area includes both agricultural and municipal sources of water pollution.
- 3)Potential participants in the area must exhibit an interest in participating in the pilot.

Some other conditions the legislation established was that a local advisory committee was to be

set up, persons engaged in mining activities could not enter into an agreement, and permits must be written to reflect the agreements set up. The budget provided for \$100,000 over the biennium to be spent for pollutant trading.

Goals

The primary goal is to ensure that water quality goals are met throughout a watershed, by allowing reductions in pollutants from all sources to be cost-effectively achieved. Under the umbrella of this larger goal, the immediate goals of the department to meet the statutory requirements are to evaluate the potential for trading; to develop and evaluate a framework for pollutant trading; to allow trades to move forward if trading appears to be viable and willing partners come forward in the pilots; and to have in place at the end of two years a process to allow future trades.

The types of trades most likely to occur in the pilot projects are Point to Point Trading and Point to Nonpoint Trading. A P-P Trade is where a point source arranges for another point source to undertake greater than required reduction in pollutant discharges in place of reducing its own discharge levels beyond the minimum technology based discharge standards. A P-NP Trade is where a point source arranges for control of pollutants from nonpoint sources to undertake greater than required pollutant reductions instead of upgrading its own treatment beyond the minimum technology-based discharge standards.

Some of the challenges facing the department in the development of a trading framework are technical, economic, regulatory, and administrative.

Technical

The following two technical sideboards could significantly influence any trading scheme:

- i. Trading Ratios (See attachment on Trade Ratios)
- ii. Geographic Targeting

A *trading ratio* specifies how many units of pollutant reduction a source may purchase in order to receive credit for one unit of pollution from another source. The trading ratio can require buyers to purchase more units of reduction than they would have achieved without trading to account for uncertainties in the level of control needed to attain water quality standards, and to provide a buffer in case traded reductions are less effective than expected. Trading ratios can also be set to achieve load reductions that maintain current water quality where improvements are not needed or can be set improve water quality above a level that would have been achieved without trades. Other important considerations include location, timing, and/or chemistry of pollutant loading that may be traded. In trading phosphorus, for example, the nature of point sources (mostly dissolved) vs nonpoint source phosphorus (mostly particulate), timing (a flush

for nonpoint sources vs continuous discharge for point sources), seasonal variations in load (summer vs spring) etc. can all significantly influence trade ratios.

Geographic Targeting is an approach that encourages trades in the following way:

- areas with the highest deliveries of nonpoint source pollution to the waters.
- areas that relatively contribute that highest load to an established end point (a lake or an impoundment) in the basin. Generally these areas are in close proximity to the end point.
- areas that are usually upstream of the location where the pollutants are traded
- areas that are, whenever possible, located within the same subwatershed or watershed in the basin

Clearly, geographic targeting can help establish trade guidelines that result in maximum reductions in pollutant loads while maintaining the water quality in the entire basin. In some cases, however, geographic targeting may be restrictive and can limit trading opportunities.

Economics

Average annual cost estimates (in \$/lb/year) for phosphorus reduction from point as well as nonpoint sources are necessary to determine a least-cost-mix approach to phosphorus control. A number of studies (The World Resource Institute Study in the Rock River Basin, 1996; Fox-Wolf Basin Technical Report, 1993; WDNR cost estimates using Facility Plans, 1996) have been conducted to estimate the average costs of point source phosphorus removal.

The unit costs of phosphorus controls for various nonpoint sources are currently being studied by the DNR Bureau of Integrated Science Services using existing data from the priority watershed projects and other documentation. This analysis will include information on the effectiveness of various best management practices in controlling phosphorus loads and the unit cost of phosphorus removal for each practice. A final report from that study will identify the effectiveness and cost of feasible practices in each of the pilot areas as well as the response in the environment to varying levels of phosphorus in the receiving water.

Legal/Regulatory

Legal/Regulatory

Compliance with Water Quality Standards

As noted earlier in this report, pollutant trading may be attractive to wastewater dischargers—municipal or industrial—which are presently required by state and federal mandates to meet an effluent limitation which they find burdensome. However, trades must assure that the agreement

between trading partners does not result, at a minimum, in a lowering of water quality and ideally improves overall water quality. This raises issues regarding the proximity of trading partners to each other—can there be a lowering of water quality in one stream segment to accommodate an improvement in water quality in another part of the watershed? Can surrogate pollutants be traded, such that the ambient concentration of one pollutant of concern is improved, but at the expense of higher concentrations of other pollutants?

Term of Trade

To relieve themselves of some of the burden of meeting traditional effluent limitations requires that a discharger find another entity be willing to take on the legal requirement to reduce its pollutant loading beyond what would normally be required of it. The shifting of legal responsibility from one entity to another, at a minimum, requires some kind of legally binding agreement between the two dischargers which also allows for the state to assure through enforcement that the water quality standards will be maintained.

Wastewater discharges are regulated by discharge permits which are issued for a maximum term (established by federal law) of five years. Most probably, a discharger trading treatment responsibility to another entity would want its discharge permit modified to reflect its lessened responsibility. However, because of the federal limitation on the length of permits, it may be difficult to enter into a binding agreement with another entity for a term in excess of the time remaining on the existing discharge permit. If the trade is between two point sources, each of which have a discharge permit, the ending date of the agreement may have to be the expiration date of the first of the permits to expire.

Historically, the Department has found that farmers who have been interested in receiving wastewater or sludge to amend their soil have been strongly inclined to enter into short-term contracts only, in the range of 3 years. They are disinclined to commit to a farm management plan for a longer term. Nonpoint grants which have up to 70 % cost-share dollars as incentives require the cost-shared practices to be maintained for longer periods of time, typically 10 years. However, standard design periods for wastewater treatment systems is longer, usually in the range of 20 years for municipal systems. So, there is presently a significant gap between the length of an agreement based on the discharge permit term or traditional nonpoint commitment and the normal length of time a plant upgrade is designed for. This may invite innovative suggestions regarding how to make trades survive the terms of permits, and be attractive to nonpoint sources.

Monitoring

Traditional end-of-pipe pollution control is relatively easy to monitor. Water quality based effluent limitations are calculated based on the assimilative capacity of the receiving stream. Dischargers are then required to sample the discharges from their pipes and report the result to

the Department. If the effluent limitations have been met, the stream is generally assumed to meet the ambient stream water quality standards. But if the trade involves control of nonpoint sources, how does not measure the actual effectiveness of the nonpoint practice to assure that it is achieving at least the same level of pollutant reduction as would traditional wastewater treatment? Will traditional nonpoint practices provide the kind of constant pollutant reduction through different seasons and through their design lives as do traditional wastewater treatment technologies? Will monitoring and reporting be required as it is for end-of-pipe treatment, and who will be responsible for doing the monitoring and reporting?

Enforcement

The Department has been given clear statutory authority to enforce the terms of wastewater discharge permits. If a violation of an effluent limitation has occurred, the statute provides specific civil and criminal remedies. It is unclear how the Department would enforce against a pollutant trading partner who does not possess a traditional (WPDES) wastewater treatment permit and who fails to achieve the level of pollutant reduction. Does the Department seek relief from the entity that has sought the trade? Is this even possible if that entity's discharge permit has been modified to reflect the trade? Under what other statutory authority could a court action be initiated against the party who is not obligate, other than by contract, to reduce pollutant loading?

Administrative/Institutional

The department can take several different roles in the administrative end of pollutant trading. The regulatory role will always be important in working with permittees. How a permittee enters into a contract for a trade can depend on whether the department is acting as a facilitator or as a broker. Act 27 allows for the department or a local unit of government to act as a broker to a trade. The department may act as a facilitator to encourage the contact between the landowner and the permittee but the permittee is responsible for developing the agreement. Another party can act as a facilitator and then the department would continue in the regulatory role it must maintain with every permittee.

There are several steps in the process before a trade is finally made. There may be a set-up contract between a permittee and a facilitator to begin negotiations. Negotiation with the landowner would take place prior to the planning or engineering work (design) of a practice. On the same track as the planning and negotiation with the landowner, the municipality will be pursuing a permit modification or revoke/reissuance to develop permit language to allow for the trade. The contract between the permittee and the landowner to implement the practice will be finalized as the permit is finalized.

Pilots

Red Cedar River, Rock River, Fox-Wolf Rivers

Map

Data collection - Modelling and Monitoring

Partnerships (Other institutional issues)

Progress to date

Rock River Pilot Status

This basin is located in south central Wisconsin. This 3000 square mile basin is diamond shaped and covers an area roughly bound by the Horicon Marsh to the North, the City of Biloit to the South, the City of Madison to the West and the City of Oconomowoc to the East.

The idea of exploring nutrient trading surfaced in this area in about 1996, a year and a half before the nutrient pilot legislation. At that time several municipalities faced with the upcoming prospect of implementing phosphorus reduction measures at their sewage treatment facilities, banded together and approached the department with the idea of using a basin wide approach to phosphorus management. As a result the Department agreed to enter into a 3 year MOU with the Rock River Watershed Partnership (RRWP). This MOU was signed by George Meyer on January 7, 1997 and committed the Department to a minimum three year relationship with this group centered around exploring alternative methods of removing phosphorus and improving water quality. While some of the momentum of this MOU may have been eclipsed by the recent legislation and statutory direction to investigate nutrient trading much of the MOU is still applicable to our current effort.

The Department and the RRWP have agreed to an aggressive work plan that will systematically take us to least cost and maximum yield approach to nutrient management/water quality management in the basin. Current efforts remain centered around phosphorus management with an acknowledgment by all parties that a successful phosphorous trading scheme could be expanded to other nutrients. The Rock River Pilot work plan consist of five elements. The RRWP has already collected \$240,000 of the needed \$340,000 to implement this plan. Specific

elements of the work plan are as follows:

1. Modeling effort – this task was begun in spring of this year. The model will divide the basin into 8 sub basins and allows us to predict water quality benefits at the mouth of each of the 8 basins from implement varies non-point and point management practices. This effort is being undertaken by Rust Engineering and is currently largely funded by grants from the Federal government.. This element is the largest single cost item and is projected to cost about \$200,000 when it is complete. Although costly, it is the centerpiece of the nutrient trading effort that will allow us to make intelligent least cost decisions in the trading environment.
2. Monitoring effort – this task has been in planning for about a year and began in earnest on August 20. This item involves a concerted effort from the RRWP to physically collect data under a variety of stream flow conditions. This effort is being closely coordinated with USGS and Department staff. This data will be used in the short run to calibrate the computer model but it should also be invaluable to future nutrient trading efforts. This project is a one year effort at this point.
3. Development of trading schemes - This effort will lay out procedures that will be used to implement the needed transactions between the point and non-point source industries within the basin. Much work needs to be done on this front over the course of the next year. A committee of RRWP, DNR and County staff began working on this effort in August and will be intensifying their effort over the next two months. This work should be completed in 1999.
4. Literature search of best management practices and their cost – this effort is the responsibility of the Department as part of our partnership effort and is being conducted by our research bureau. This report will summarize what has been learned from other projects and past research efforts. Both point and non-point practices will be investigated. This information should help communities and industry determine if trades are advantageous. This report will be available by the end of the year.
5. Analysis of instream results from implementing phosphorus management - this effort is a collaborative effort from DNR research, DNR fisheries staff, and the University of Wisconsin. Funding for the UW's involvement is through the RRWP. This effort should help us understand why the Rock River resources are limited and what the response of the river will be to removal of certain forms of pollutant. This effort will further help us target where our nutrient trading efforts are best spent. 27 sites in the basin will be assessed from a chemical, physical and biological perspective as part of this effort. The results of this analysis should be available in early 2000.

Currently, permits that are being reissued by the Department that would otherwise require

phosphorous are being modified for those entities within the basin that are participating in the RRWP. This modification is essentially placing phosphorus removal on hold until the results of the above work effort are available. We believe this effort should help the Department and the regulated community make intelligent choices about when and where to pursue nutrient trades. The effort with the RRWP should result in trades in the year 2000.

POLLUTANT TRADING PILOT REPORT FOR FOX-WOLF DRAINAGE BASIN

The Fox-Wolf River Basin has established a team consisting of partners from the public and private sector who are interested in the possible application of pollutant trading to address some of the water quality concerns in the basin. This team is headed by Fox-Wolf 2000 and members include Municipal Governments, County Land Conservation Departments, Tribal Representatives, Regional Planning Commission Representatives, University of Wisconsin, Paper Industry Representatives, Municipal Environmental Group, Green Bay Metropolitan Sewerage District, Sierra Club, U. S. Geological Survey and Department of Natural Resources. The charge to the group is to identify potential legal, regulatory, technical, institutional and communications issues related to pollutant trading and determine the appropriate means of addressing them. The goal is to establish a pilot trade or trades to determine the effectiveness and feasibility of pollutant trading in the basin.

The group has developed proposals to gather the necessary information and submitted requests to various sources for funding. Proposals include: Researching Economic Factors, Conditions and Impacts of a Watershed-Based Trading Program for Phosphorus in the Fox-Wolf Basin, Developing Institutional and Management Structure in Support of a Watershed-Based Trading Program for Phosphorus in the Fox-Wolf Basin and Identifying Legal and Regulatory Issues for a Watershed-Based Trading Program for Phosphorus in the Fox-Wolf Basin. Funding has been committed by some groups including the Fort James Corporation for collecting data specific to nonpoint sources of phosphorus, the Joyce Foundation for modeling activities, Green Bay MSD and the Department of Natural Resources. A potential pollutant trading opportunity has also been identified in the basin. Other progress includes establishment of a Web Site for the Fox-Wolf Basin that includes information about pollutant trading and work has started to establish an inventory of point sources within the basin who are potential pollutant traders.

Previous studies by various groups dealing with water quality concerns in the Fox River and Green Bay have identified phosphorus as one of the major water quality impacters. These studies have also shown that while point source dischargers such as municipal and industrial wastewater treatment plants contribute significant amounts of phosphorus, the major source is nonpoint contributions from urban and rural lands. Pollutant trading between point and nonpoint sources may result in significantly more phosphorus reductions to surface waters than can be achieved by

further limiting point sources.

The Fox-Wolf Basin is somewhat unique from the other pilot basins since phosphorus, which is a primary target of point to nonpoint trades, has been regulated for municipal dischargers for many years as the result of the International Joint Commission agreement to reduce phosphorus discharges to the Great Lakes. Most of the municipal dischargers have already installed the necessary processes and equipment to remove phosphorus from their discharges down to a concentration of 1 mg/l. The development of NR 217 which limits phosphorus discharges from industries and other municipalities on a statewide basis will not have as large an impact in the Fox-Wolf Basin due to this situation. There are still opportunities for phosphorus trades involving industries and some municipal dischargers either between point sources or between point and nonpoint sources, however. Studies conducted in recent years indicate that significant reductions in phosphorus are still required to achieve the water quality that residents of this basin desire. Finding the most cost effective system to achieve this goal will likely include pollutant trading as one of the tools. It is also likely that the development of Total Maximum Daily Loads (TMDLs) for streams will increase the opportunity for pollutant trading for compounds other than phosphorus.

Red Cedar

The Red Cedar Watershed is in west central Wisconsin and is part of the Lower Chippewa River Basin. The Red Cedar River basin drains approximately 1800 square miles and includes parts of Barron, Chippewa, Dunn, Polk, Rusk, Sawyer, St. Croix and Washburn Counties. Norther parts of the basin are predominantly forested and agriculture is a dominant land use in the rest of the basin. The municipalities in the basin include Menomonie, Glenwood City, Downing, Boyceville, Wheeler, Colfax, Prairie Farm, Ridgeland, Dallas, Chetek, Turtle Lake, Almena, Barron, Cameron, Rice Lake, Cumberland, Haugen, and Birchwood.

A project was started here in 1994 that has become known as the Red Cedar Steering Committee. This project was to explore new ways of managing the water resource within the watershed. It had a project coordinator funded through a USEPA grant and employed by the University of Wisconsin Extension. This coordinator served as staff to an otherwise voluntary organization. This organization has met at a rate of once every three weeks over the last four years to discuss and work on concerns involving water quality within the watershed. This group is the partnership group and has discussed the policy issues concerning pollutant trading.

There has been extensive monitoring within the Red Cedar Watershed to establish water quality parameters and to gather public perception. Enough information has been gathered to develop and calibrate the SWRRB WQ model. This model gives us approximate loading rates for total suspended solids and total phosphorus, and partitions them out into different land uses and

allows for routing of these parameters through watershed waterbodies. This has allowed for the development of a conceptual phosphorus management plan for the basin. This is one of the products that the partnership group has developed and agreed upon. The partnership group has also sponsored a lake monitor user survey to have residents and users around impoundments in the watershed use a self-help approach to collect information will assist in setting goals for the nutrient phosphorus as it relates to frequency duration and concentration of algae blooms within the impoundments.

To date, only the City of Cumberland has been interested in pursuing phosphorus trading options. Their desire is to explore a more economical way to remove the phosphorus required at their point source discharge by improving nonpoint source contributions. The city has proceeded through facility planning and has engineering estimates of cost of construction and operation to accomplish phosphorus removal at their treatment plant. They know design flows and phosphorus concentrations so accurately can predict the pounds of phosphorus that would need to be treated at the point source. They are actively pursuing contacts with three local landowners with the assistance of the Barron Land conservation Department. They are inventorying nonpoint sources and considering best management practice options to control these sources. They have yet to reach agreement or even discuss terms regarding what would motivate these landowners to install best management practices to control nonpoint phosphorus sources. They do not have any cost estimates or any agreements which might indicate what would motivate landowners to install these practices. They are keeping track of their administrative costs so this can be determined as a separate factor.

There has also been a slight modification of policy regarding phosphorus removal for the Village of Colfax. Because the Village of Colfax is within the trading area and they had applied for an alternative limit from removing phosphorus due to economic hardship, it has been agreed that Colfax will have to proceed through additional steps before granting this alternative limit. Colfax will now have to determine the economic ability of providing a trade with either point or nonpoint sources as part of their economic liability to removing phosphorus. This analysis has just begun and is expected to be completed in about nine months.

Any trades that are accomplished in the Red Cedar watershed will have to be evaluated carefully with the overall watershed goals. Because the phosphorus loading to the is largely dominated by nonpoint source approximately 80 percent, and because overall phosphorus removal goals will be set near 50 percent, any trades will have to be evaluated in light of meeting the overall goal. The partnership group will be valuable in providing local input into this decision-making process. The overall watershed goal is to remove enough phosphorus from the surface water to make a significant difference in the occurrence of algae blooms on the impoundments in the watershed and to reduce the macrophyte concentrations within the flowing streams to alleviate any diurnal DO problems during low flow. To accomplish this, the group will continue to do perception monitoring on the flowages, additional in water monitoring to allow for modeling of major impoundments and pursue priority watershed projects.